

## **Summary of Preliminary Assessment on Structural, Fire and Electrical Safety**

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Name of the Factory	: AMANA KNITTEX
Address of the Factory	: Amana Complex, Masdair Gorostan, Fatullah, Narayanganj, Bangladesh.
Present Status of the Factory	: Under Operation.
Structural Assessment Conducted by	: TUV
Date of Structural Inspection	: 5 <sup>th</sup> May, 2015
Fire Assessment Conducted by	: TUV
Date of Fire Inspection	: 8 <sup>th</sup> July, 2015
Electrical Assessment Conducted by	: TUV
Date of Electrical Inspection	: 8 <sup>th</sup> July, 2015
BGMEA Membership No.	: 5929
BKMEA Membership No.	: 1982

### **BASIC INFORMATION:**

The assessed building was ten storied RCC building from ground floor to roof and there is a basement floor having beam column and flat plate with supported column framing system. The following information was noted:

- i. Building Usage Type : Garment factory.
- ii. Structural System : Basement, 8<sup>th</sup> and 9<sup>th</sup> floor – Beam slab frame  
GF to 7<sup>th</sup> floor - Flat Slab Frame.
- iii. Floor System : Basement, 8<sup>th</sup> and 9<sup>th</sup> floor – Beam Slab  
GF to 7<sup>th</sup> floor - Flat plate floor slab
- iv. Floor Area : Total floor area is 124,360 sft. approx.
- v. No. of Stories : 10 Storey + One basement
- vi. Construction Year : 2006 to continuing.
- vii. Foundation Type : Pile foundation.
- viii. Design Drawings : Available.
- ix. Soil Investigation Report : Available.
- x. Construction Materials : Stone Chips (Identified by removing plaster)
- xi. Generator : At ground floor.

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for both Structural and Fire & Electrical Safety comprises in Short Term, Mid Term and Long Term basis.

The recommendations for **Structural Safety** corrective action are:

Short Term (Immediate) : None.

Mid Term (6-weeks) :

- Factory Engineer to review design, loads and columns stresses in area identified above.
- Verify insitu concrete stresses either by 100mm dia. cores or existing cylinder strength data for identified columns.

Long Term (6-months) :

- Produce and actively manage a loading plan for all floor plates within the factory giving consideration to floor capacity and column capacity.

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- The joint of steel structure needs to be checked by building engineer and the bracing system is required to ensure the stability of the structure.

The recommendations for **Fire & Electrical Safety** corrective action are:

**(A): Recommendations for Fire Safety corrective actions:**

<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>• None.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (1 ~ 2 weeks) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>• The minimum clear width of the pathway should be 0.9 meter</li> <li>• Remove all temporary items from all escape routes, aisles and passageway.</li> <li>• Provide aisle marking with arrow guiding on all Evacuation pathways</li> <li>• Factory management should check alarm call points, alarm &amp; detection system periodically and maintained the record properly.</li> <li>• The first aid hose and standpipe performance should be checked periodically and properly tagged.</li> <li>• Provide additional firefighting equipment like sand &amp; water buckets near exit or easily accessible area for first phase firefighting.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>• Replace all existing exit doors on evacuation routes, exit doors with side hinged type door, which swing outward and in the direction of travel. Swinging of the door should not constrict the width of the corridor / passage below 0.9 meter.</li> <li>• Remove all locking device from all egress door. All exit doors should be open-able from the side they serve without the use of a key.</li> <li>• Provide handrails on both side of each stairway with height of 0.9m measured from the nose of stair to the top of the handrail.</li> <li>• Doors in stair should be outward opening, side-swing, self-closing, non-lockable 2 hours fire rated doors in all stair way encloses.(Also require fire rated door at the floor occupied by other tenants)</li> <li>• Prepare design for installation of fire rating smoke proof enclosure. 2 hours fire rating doors for exit should</li> </ul>

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	<p>not be less than that of 4 hours fire resistance rating of the walls of the smoke proof enclosure.(Also require fire rated door at the floor occupied by other tenants)</p> <ul style="list-style-type: none"><li>• Prepare proper plan and design for fire rated barrier for 2 hour fire rating separated corridor at ground floor.</li><li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation and generator rooms, which located at the adjacent to final evacuation route of stairs 1 at south &amp; stair 2 at west side respectively.</li><li>• Prepare proper plan for fire separated entry lobby, 4 hours fire walls and 2 hours fire rated self-closing doors.</li><li>• Prepare proper plan and design for 4 hours fire rated barriers with 2 hours fire rated door at 5th floor boiler room.</li><li>• The egress paths should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for all corridors &amp; exit doors. Aisles should be provided with a minimum 2 lux.</li><li>• The stairway should be illuminated with emergency lighting with power back-up supply &amp; illumination should be a minimum of 10 lux for stairway.</li><li>• Produce design and plan for automatic detection system with automatic fire alarm.(Also needs to cover the floors occupied by other tenants)</li><li>• Install Manual activation call point at all exit routes</li><li>• Provide adequate nos. of smoke detectors to cover the whole factory building.</li><li>• Within 6 Weeks, Prepare proper design and plan for dedicated fire pump with alternate backup power supply.</li><li>• Replace existing 1 inch hose pipe replace with 1.5 inch hose pipe to meet the requirement of RMG guideline.</li><li>• Prepare plan and design for dedicated water storage tank for firefighting operation.</li><li>• Prepare proper design and plan for fire lifts equipped with approved intercommunication (including two way</li></ul>
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	<p>voice communications) with the fire command station or control room on the ground floor lobby of the building.</p> <ul style="list-style-type: none"> <li>• Complete full design and plan for providing fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.</li> </ul>
<p>Long Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 months)</i></p>	<ul style="list-style-type: none"> <li>• Install smoke proof enclosure at emergency stairways to separate from the area of incidence. (Also require fire rated door at the floor occupied by other tenants)</li> <li>• All stairway to have direct access to outside of the factory building, which requires 2 hour fire rated construction at ground floor for fire separated corridor.</li> <li>• Provide 4 hours fire rated barriers with 2 hours fire rated doors at ground floor substation and generator rooms, which located at the adjacent to final evacuation route of stairs 1 at south &amp; stair 2 at west side respectively.</li> <li>• Implement the plan for fire separation 4 hours fire walls and 2 hours fire rated self-closing doors in basement level.</li> <li>• Provide 4 hour's fire rated barriers with 2 hours fire rated doors with 4 hours fire rated wall at 5th floor boiler room.</li> <li>• Install automatic detection system with automatic fire alarm. (Also needs to cover the floors occupied by other tenants)</li> <li>• Install dedicated fire pump with alternate backup power supply.</li> <li>• Stand pipe supplying first aid hose should have minimum pressure of 200 KPa.</li> <li>• Provide dedicated storage tank for firefighting operation</li> <li>• Install fire lifts equipped with approved intercommunication (including two way voice communications) with the fire command station or control room on the ground floor lobby of the building.</li> <li>• Provide fire command station equipped with detailed floor plans along with clearly demarcated locations of fire detection and fighting devices and through the panel board able to detect fire alarm from any floor.</li> </ul>

**(B): Recommendations for Electrical Safety corrective actions:**

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<p>Immediate</p> <p><i>(the factory should not continue to be occupied until these non-conformities have been rectified):</i></p>	<ul style="list-style-type: none"> <li>Over current protection devices (Circuit breakers) should be installed at the outgoing circuit of all distribution panels.</li> </ul>
<p>Short Term</p> <p><i>(Actions that must be incorporated into a Fire Safety Management Plan immediately (a week) and should be a regular activity</i></p>	<ul style="list-style-type: none"> <li>None.</li> </ul>
<p>Mid Term</p> <p><i>(The remedial works indicated must be carried out within a period of 6 weeks)</i></p>	<ul style="list-style-type: none"> <li>Refill the silica gel with proper working condition.</li> <li>All unwanted materials should be removed from Generator room.</li> <li>Provide electrical graded rubber mats of adequate size in front of distribution panels.</li> <li>Install smoke detection in the substation room.</li> <li>Provide and maintain clear and legible identifications numbers &amp; names on all incoming and outgoing circuits of HT and LT panel.</li> <li>Adequate number of caution boards should be kept in the substation room.</li> <li>Avoid looping and bunch of cable at MCCB/MCB and bus bar terminal, use individual circuit and over current device for every incoming and outgoing circuit at the distribution boards.</li> <li>Provide circuit diagram /circuit list with proper current ratings and fuse size, marking for DBs identifying end use load, voltage, number of phases.</li> <li>Provide proper separate earthing/grounding to transformer. Ensure that transformer body frame to have two separate and distinct connections to the earth / ground.</li> <li>Provide adequate earthing to doors to DBs. Ensure that all electrical panels provided with proper and separate earth potential.</li> <li>Provide separate earthing system for lightning protector. Ensure that this earthing should be separate from other earthing system.</li> </ul>

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### Long Term

*(The remedial works indicated must be carried out within a period of 6 months)*

- 1. Provide updated Electrical layout drawing prepared after proper locations of all outlets for lamps, fans, fixed and transportable appliances, motors etc.
- 2. Drawings to indicate exact positions of all points of switch boxes and other outlets to match existing installation.
- 3. As built drawing to be approved by the engineer-in-charge.
- Area of substation to meet requirements of Table 4.3 of RMG Guideline; the area should be 45m<sup>2</sup>, or relocate the substation room.
- Maintain the minimum height of 3.6 m for the substation room. Increase the height or relocate it.
- Provide 4 hour fire rated walls & 1.5 hour fire rated door the substation room on ground level.
- 1. Design to have proper segregation of different end used loads.
- 2. Wiring design to have separate and distinct sub-circuits for power and heating system.
- 3. All DBs to be placed conveniently.
- 4. Wiring to be neat, tidy and located near ceiling.
- For buildings > 20m high, provide at least one vertical shaft of 200 x 400 mm for every 1500 sq.m. floor area.
- Provide proper height of panel board (< 2m from floor level).
- Each circuit should have a separate neutral (use of common neutral for more than one circuit shall not be permitted).
- Seal the cable entry-exit points of (DB/SDB)'s with non-flammable materials. In addition:
  - 1. Ensure that DB panels / Switchgears to be vermin / damp proof.
  - 2. Ensure all unused holes / openings in DBs to be blocked properly.
- 1. Provide the ECC to meet minimum cross-sectional area as per table 4.5.

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	<p>2. Ensure that connections between conductors / equipment provided to durable electrical continuity and adequate mechanical strength and protection.</p> <p>3. The continuous earth connection is provided back to the main intake supply earth.</p>
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